Surgical Technique

Repair of Stenotic Saphenous Vein Grafts

in Infrainguinal Arterial Reconstructions

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We describe a technique of repairing autologous vein grafts affected by segmental stenosis. This technique can be of value both in reoperating on an old saphenous vein graft implanted for infrainguinal limb revascularization and in harvesting fresh saphenous vein in which an unexpected short-segment stenosis has been encountered. ***(Tex Heart Inst J 1998;25:118-9)***

Autologous vascular graft is still the most biologically compatible vascular conduit, and autologous saphenous vein is considered the graft of choice for infrainguinal arterial reconstructions because of its long-term patency rate, in comparison with polytetrafluoroethylene grafts.[1] Unfortunately, postbypass venous and juxta-anastomotic stenoses do occur.[2] Furthermore, on some occasions before implantation, intraoperative examination of the greater saphenous vein reveals such unexpected abnormalities as calcified webs or thickened and fibrotic valve cusps.[3]

Conventional vein-patch angioplasty for repair of infrainguinal bypass grafts that are failing due to anastomotic stenosis is well established.[2] Moreover, it is well documented that vein-graft surveillance and prompt correction of abnormalities leads to prolonged patency and to a higher likelihood of overall success, in comparison with waiting for the graft to occlude.

Branch patch angioplasty was initially described by Muller-Wiefel.[4] We now describe a modification of that technique and extend its application to the repair of *any* narrowed segment along the saphenous vein graft, before or after implantation.

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The stenotic segment is opened by a longitudinal incision. After the lumen is entered, the incision is continued across the stenosis and extended until healthy vascular wall is encountered. All calcified venous cusps or plaques are excised to achieve a feathered margin. The vascular lumen is best exposed by 2 stay sutures of 5-0 polypropylene (Ethicon; Somerville, NJ) placed at the incision's midpoint (Fig. 1A and B).

A small piece of naturally bifurcating vein graft, with a lumen not less than 2 mm in diameter at its branches, is then harvested and cut across its 2 pedal tributaries to adjust to the length of the anastomosis (Fig. 1C). The inverted Y-shaped graft is then converted into an inverted T shape by incising the branches as shown in Figure 1D. Handling of the graft is easiest if one grasps it by the vertical limb and aligns the limb perpendicular to the plane of anastomosis; when suturing, one pulls the graft taut by the vertical limb.

The anastomosis is begun at the right of the graft's apex (Fig. 1E). After each pointed end is rounded, 6-0 polypropylene (BV-1 tapered needles) is used to form a continuous mattress suture. When the suture line is complete, the graft's vertical limb is ligated (Fig. 1F). A Garrett vascular dilator (Specialty Instrumentation, Inc.; Nashville, Tenn) is introduced gently into the toe and heel of the anastomosis, to confirm the patency and adequacy of the lumen.

Key words: *Blood vessel prosthesis; leg/blood supply; inguinal canal/blood supply; ischemia/surgery; saphenous vein/angioplasty; vascular patency*

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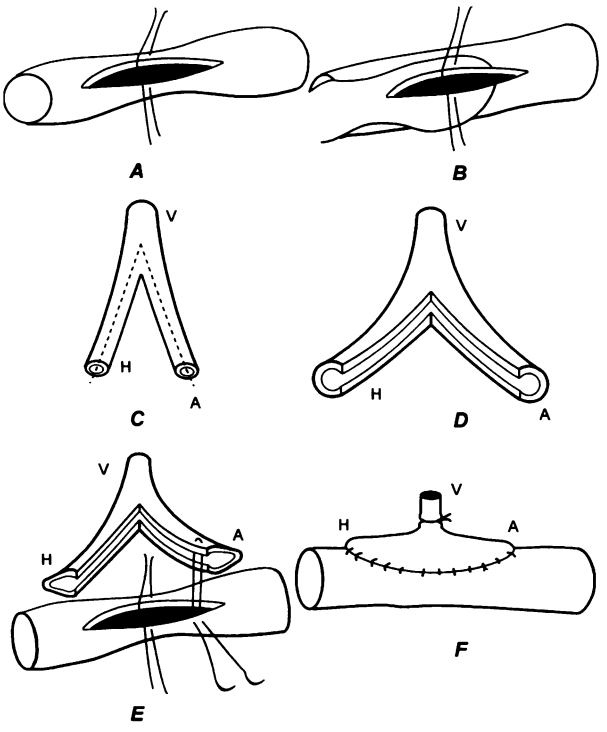

Fig. 1 *The narrowed vein segments are incised and traction sutures are placed. A pre-implantation graft (**A**) is here compared with a post-implantation graft (**B**), which has been incised across the hood of the old anastomosis. **C**) In preparing a small piece of bifurcated vein graft, the surgeon harvests an inverted Y segment with 2-mm pedal lumina. **D**) The vertical limb of the new inverted T graft provides a "handle" for atraumatic tissue manipulation and retraction. **E**) When the patch is parachuted, anastomosis is end-to-side. The sutures are started on the bias, off the apex of the graft, as shown. **F**) 6-0 polypropylene mattress sutures are placed with BV-1 tapered needles. Upon completion of the repair, the vertical limb is ligated.*

H = heel (of anastomosis); A = apex; V = venous branch

Discussion

Since 1995, we have used this technique in lieu of conventional patch angioplasty in 6 patients, and have not encountered any aneurysm formation or intraluminal thrombi.

Residual ipsilateral veins, contralateral long saphenous vein branches, or (if those are unavailable) the cephalic vein tributaries in the antecubital fossa can all be used as donor material for small bifurcated grafts.

Finding usable vein in patients who need infrainguinal arterial reconstruction can be a daunting problem. This technique is useful if suitable vein graft material is unavailable (e.g., if each of the tributaries of a bifurcated vein segment is by itself too small to replace the stenotic segment). This technique also aids in minimizing the distortion and narrowing of the inflow and outflow of the vascular anastomosis, and it can be used at the proximal inflow site for a smooth take-off from the femoral artery. Finally, this method enables minimal handling of the vascular wall. Reducing trauma to the vascular wall—thereby preserving the integrity of delicate endothelial and subendothelial cytoprotective structures[5]—should limit the hyperplastic response of the myointima.

Acknowledgments

The authors wish to acknowledge the help of Yvonne and Ross Alameddine in the illustration and redaction of this manuscript.

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